

High-Precision Instrumentation for CO₂ Isotope Ratio Measurements, Phase I

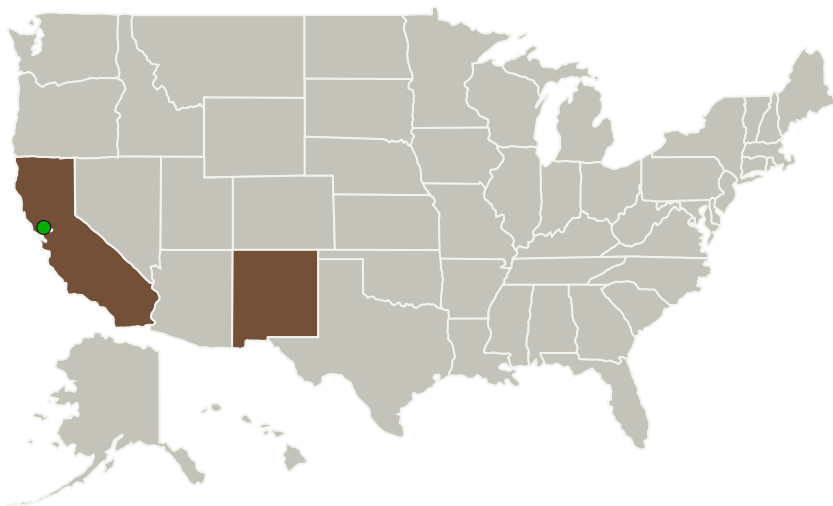
Completed Technology Project (2011 - 2011)



Project Introduction

Knowing atmospheric ¹³CO₂/¹²CO₂ ratios precisely is important to understanding biogenic and anthropogenic sources and sinks for carbon. Currently available field deployable instrumentation have unfavourable attributes such as high power requirements, are extremely expensive, are too large, are not proven or designed to run continuously or unattended for extended periods, and/or are unable to properly compensate for nature pressure, temperature and moisture variations. Southwest Sciences proposes to develop a high precision isotopic carbon dioxide measurement system that nullifies interferences from pressure, temperature and moisture, and that has characteristics compatible with field deployable instrumentation. This instrument would be fully autonomous, requires no consumable and would not need periodic maintenance. In Phase 1, we will build a simplified single-pass spectrometer and demonstrate the ultimate achievable precision under ideal conditions, operating parameters, and Allan variance measurements. In Phase 2, we will leverage Southwest Science's extensive experience with multi-pass cells and incorporate additional temperature and pressure compensation techniques for operation under non-ideal conditions. At the end of Phase 1, we expect this instrument to be at TRL-4.

Primary U.S. Work Locations and Key Partners



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for CO₂ Isotope Ratio
Measurements, Phase I

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Organizations Performing Work	Role	Type	Location
Southwest Sciences, Inc.	Lead Organization	Industry	Santa Fe, New Mexico
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	New Mexico

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138527>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Southwest Sciences, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

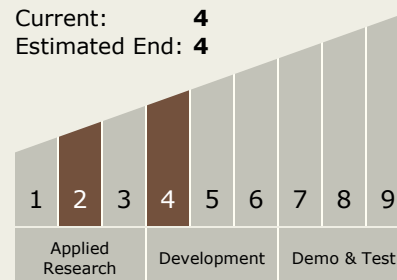
Carlos Torrez

Principal Investigator:

Anthony M Gomez

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
 - └ TX06.1.1 Atmosphere Revitalization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System